

603 Concrete Barrier

603.1 Description

- (1) This section describes providing permanent and temporary concrete barrier and transitions.

603.2 Materials

- (1) Furnish materials conforming to the following:

Joint filler	415.2.3
Steel rail, cap rail, and fittings.....	614.2
Delineator brackets and delineator reflectors	633.2

- (2) Furnish grade A concrete conforming to [501](#). For cast-in-place barrier, conform to class I barrier concrete requirements and provide QMP as specified in [715](#).
- (3) Provide epoxy-coated steel reinforcement for permanent concrete barrier as specified for coated high-strength bar steel reinforcement in [505.2.4](#).
- (4) Manufacture precast barrier in a plant listed under precast concrete fabricators on the APL. Provide an ordinary surface finish as specified in [502.3.7.2](#) on exposed precast surfaces unless the forms provide a suitable finish. Cure precast barrier as specified in [415.3.12.2](#) using a curing compound conforming to [501.2.8](#). The contractor may steam cure precast barrier, if the engineer approves the temperature and procedure. Apply curing compound after steaming.
- (5) Furnish adhesive for concrete anchors conforming to ICC-ES AC308 or ACI 355.4 and capable of providing the strength the plans show. Provide the adhesive manufacturer's installation instructions to the engineer before installing anchors.

603.3 Construction

603.3.1 Permanent Barrier

603.3.1.1 General

- (1) Construct permanent barrier of the type the bid item indicates. Encoded types are defined as follows:

TABLE 603-1 CONCRETE BARRIER BID ITEM ENCODING

BARRIER BID ITEM TYPES	DESCRIPTION		CODE
<p>example: Concrete Barrier Type S36A is a 36" single sloped median retaining wall barrier</p>	SHAPE	New Jersey shape	NJ
		F shape	F
		Vertical	V
		Single slope barrier	S
<h4 style="text-align: center;">TRANSITION BID ITEM TYPES</h4> <p>example: Concrete Barrier Transition Type F32SF to S32 is a transition from 32" single faced F barrier to a 32" single sloped barrier</p>	CLASS	Standard barrier section	none
		Median retaining wall	A
		Short barrier section	B
		Roadside retaining wall	C
	FACES	Double faced barrier	DF
Single faced barrier		SF	

- (2) Excavate for barrier footings as the plans show. Where new barrier penetrates existing pavement, saw out the pavement full depth in the required excavation area. Backfill, dispose of excess material, and restore the grade after placing footings.
- (3) Cast permanent barrier and transitions in place. Use construction methods conforming to [502](#) and conform to the hot weather placement requirements of [501.3.8.2](#). Use forms or engineer-approved slip form methods for barrier. Use forms for transitions. Construct barrier on horizontal curves as a series of 12-foot or shorter chords.
- (4) Install delineators at the spacing the plans show.

603.3.1.2 Anchor Dowels

- (1) Anchor dowels are not required if the base and barrier are cast in one pour. If casting separately, cast anchor dowels in the supporting surface, or secure them in drilled holes with adhesive. Clean drilled

holes and install dowels according to the adhesive manufacturer's recommendations. Ensure installed dowels develop the strength the plans show.

603.3.1.3 Joints

- (1) Place 3/4-inch expansion joints in the barrier and footing matching existing pavement expansion joints and at plan locations. Use filler material sized to conform to the cross-section of the barrier and footing.

603.3.1.4 Curing

- (1) Cure permanent concrete barrier as specified in [415.3.12.2](#). Use PAM as required in [415.3.12.1](#).

603.3.1.5 Straightedging

- (1) While the concrete is still plastic, test the wall surfaces, except vertical surfaces on horizontal curves, for trueness with a 10-foot straightedge. Test the total surface area of the barrier top and face by holding the straightedge in successive positions parallel to the length of the barrier. Straightedge the barrier in successive stages of not more than 1/2 the length of the straightedge.
- (2) Immediately, fill any depressions or projections that deviate more than 3/8 inch in 10 feet with freshly mixed concrete or strike-off and refinish the surface.

603.3.1.6 Surface Finish

- (1) Broom finish exposed slip-formed surfaces. Except for footings, provide a sack rubbed finish on exposed formed surfaces as specified in [502.3.7.5](#).

603.3.1.7 Surface Smoothness Tolerance

- (1) After the barrier hardens, test the top and upper front face for smoothness with a 10-foot straightedge. Do not straightedge the front face across chord boundaries on horizontal curves. The engineer will accept areas that show high spots or depressions greater than 3/8 inch but not greater than 3/4 inch in 10 feet. The contractor may grind high spots to less than 3/4 inch in 10 feet tolerance. Remove and replace areas that have high spots or depressions in excess of 3/4 inch in 10 feet on the barrier top or face surfaces.
- (2) The engineer will evaluate vertical surfaces on horizontal curves to ensure that they are perpendicular to the pavement surface.

603.3.2 Temporary Precast Barrier

603.3.2.1 General

- (1) Conform to the quality standards for temporary barrier described in [CMM 145](#). Ensure that barrier delivered to the project, both for initial use and for replacing barrier damaged on the project, meets the criteria for acceptable barrier. Maintain barrier on the project at or above the marginal level and replace barrier if its condition becomes unacceptable.
- (2) Where temporary barrier abuts permanent barrier, connect temporary to permanent barrier with steel rail and install steel cap rail on the first abutting section of temporary barrier.

603.3.2.2 Delivery, On-The-Project Trucking, and Removal

- (1) Under the Concrete Barrier Temporary Precast Delivered bid item, furnish and deliver temporary barrier to work sites within the project and remove it upon project completion.
- (2) Deliver temporary barrier to a project work site in one of the following ways:
 1. Deliver barrier from outside the project.
 2. Load barrier from one work site, truck to another work site on the project, and unload it.

603.3.2.3 Installation

- (1) Under the Concrete Barrier Temporary Precast Installed bid item, install temporary barrier in contract-identified locations or as the engineer directs. Also make contract-identified or engineer-directed moves that do not require trucking and reinstall at those new locations.

603.3.2.4 Anchoring Barrier

- (1) Anchor barrier where the contract specifies, the engineer directs, and for situations the plan details show. Move and re-anchor as required to continuously protect construction operations. Fill holes after removal in areas that will remain in service.

603.4 Measurement

- (1) The department will measure the Concrete Barrier, Concrete Barrier Single-Faced 32-Inch, Concrete Barrier Double-Faced 32-Inch, Concrete Barrier Transition Section 32-Inch bid items by the linear foot acceptably completed, measured along the base of the barrier.

- (2) The department will measure the Concrete Barrier Fixed Object Protection bid items by the linear foot acceptably completed, measured as the centerline length within the pay limits the plans show.
- (3) The department will measure the Concrete Barrier Transition bid items as each individual transition acceptably completed.
- (4) The department will measure the Concrete Barrier Temporary Precast Delivered by the linear foot acceptably completed, measured as the linear feet of installed length once for each contract-identified work site within the project and other moves the engineer directs. The department will only measure moves requiring a truck haul. The department will not measure moves made solely to accommodate the contractor's means and methods, to replace unacceptable concrete barrier, to replace damaged concrete barrier, or to reposition displaced concrete barrier.
- (5) The department will measure Concrete Barrier Temporary Precast Installed by the linear foot acceptably completed, measured along the base of the barrier after installation for each contract-identified or engineer directed initial installation. The department will also measure subsequent contract-identified or engineer directed reinstallations. The department will not measure installations made solely to accommodate the contractor's means and methods, to replace unacceptable concrete barrier, to replace damaged concrete barrier, or to reposition displaced concrete barrier.
- (6) The department will measure the Anchoring Concrete Barrier bid items by the linear foot acceptably completed, measured after anchoring along the base of the barrier. The department will measure anchored barrier moved and subsequently anchored in a new location. The department will not measure anchoring required solely to accommodate the contractor's means and methods.

603.5 Payment

603.5.1 General

- (1) The department will pay for measured quantities at the contract unit price under the following bid items:

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
603.0105	Concrete Barrier Single-Faced 32-Inch	LF
603.0205	Concrete Barrier Double-Faced 32-Inch	LF
603.0405	Concrete Barrier Transition Section 32-Inch	LF
603.1000 - 1999	Concrete Barrier (type)	LF
603.2000 - 2999	Concrete Barrier Fixed Object Protection (type)	LF
603.3000 - 3999	Concrete Barrier Transition (type)	EACH
603.8000	Concrete Barrier Temporary Precast Delivered	LF
603.8125	Concrete Barrier Temporary Precast Installed	LF
603.8500	Anchoring Concrete Barrier Temporary Precast	LF
603.8505	Anchoring Concrete Barrier Temporary Precast on Bridge Decks	LF

603.5.2 Permanent Barrier

- (1) Payment for the permanent barrier, fixed object protection, and transition bid items is full compensation for providing barrier or the specified transition; for excavating and backfilling for all types except roadside retaining wall; and for restoring the grade.
- (2) The department will pay for permanent barrier deficient in smoothness by more than 3/8 inch but not greater than 3/4 inch, or ground to less than 3/4 inch, at 75 percent of the contract unit price. The department will administer the price adjustment under the Nonconforming Smoothness Concrete Barrier administrative item.
- (3) The department will pay separately for associated work as follows:
 - Sawing existing concrete or asphalt not placed under the contract, under the Sawing Concrete or Sawing Asphalt bid item as specified in [690.5](#).
 - Excavating and backfilling required for roadside retaining wall barrier, Concrete Barrier Type S(size)C bid items, under the Excavation bid items as specified in [205.5](#) and under the Backfill Structure bid items as specified in [210.5](#).
 - Providing delineators for permanent barrier, under the Delineator Brackets and Delineator Reflectors bid items as specified in [633.5](#).

603.5.3 Temporary Barrier

- (1) Payment for Concrete Barrier Temporary Precast Delivered is full compensation for initial delivery or trucking between work sites, and removing after contract completion.

- (2) Payment for Concrete Barrier Temporary Precast Installed is full compensation for each installation including providing steel rail connections and steel cap rail for installations abutting permanent barrier.
- (3) The department will not pay for replacing unacceptable concrete barrier, replacing damaged concrete barrier, or repositioning displaced concrete barrier.

603.5.4 Anchoring Barrier

- (1) Payment for the Anchoring Concrete Barrier bid items is full compensation for providing anchoring devices; for moves required during construction; for drilling and coring; for removing anchoring devices; and for filling holes.
- (2) The department will pay separately for providing the concrete barrier under the other 603 bid items.